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EARTH SCIENCES DIVISION

Integrated Safety Management Plan

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Change History

This Health and Safety Plan is reviewed and modified as necessary as part of the Division's Annual Self-Assessment to assure continuous improvement. The following table outlines the change history to this Plan:

Revision	Change Date	Summary of Changes
REV 5	14 July, 2003	Minor update. Expanded explanation of work authorizations and process and expectation for students. Plan modified to include updated opportunities for improvement and appendices.
REV 4	February 2002	Significant revision. Improved accident investigation process, developed ergonomics initiative, changed process to better involve line management and changed procedure for matrixed employees. Updated opportunities for improvement and appendices.
REV 3	June 2001	Minor updates including updated opportunities for improvement and appendices.
REV 2	June 1999	Minor updates including updated opportunities for improvement and appendices.
REV 1	May 1997	Initial document developed under Integrated Safety Management System

INTRODUCTION

The Earth Sciences Division (ESD) at Berkeley Laboratory performs fundamental and applied geosciences research related to subsurface energy resources, nuclear waste disposal, environmental restoration and ecology, and climate change. Core capabilities include: vadose and saturated zone hydrology, fracture hydrology, atmospheric sciences, petroleum and geothermal reservoir engineering, seismic and electromagnetic geophysics, isotope geochemistry, and rock and soil physics.

Scientifically, ESD is organized by Resource Departments (Geophysics-Geomechanics; Hydrogeology and Reservoir Dynamics; Geochemistry; and Microbial Ecology and Environmental Engineering), that serve as the intellectual homes for every staff member. In addition to safety, Department Heads are responsible for staffing, promotions, and training matters. Departments are further divided into Groups, each with a scientific focus, led by a Group Leader. Departments provide the people and the Facilities to do the research, but do not control research funds.

Research in ESD is conducted within the context of five large Research Programs (Nuclear Waste; Energy Resources; Fundamental and Exploratory Research; Environmental Remediation Technology, and Climate Variability and Carbon Management) that are aligned to our major DOE funding sources. Program Heads and their designees (e.g., Group Leaders and Program Coordinators) are the principal points-of-contact between ESD and DOE, and they share a major responsibility for sustaining and building programs. Every member of the ESD scientific/technical staff is assigned to work on one or more projects in these five Programs. Because many employees work on more than one project during a fiscal year, it is not uncommon that an employee will have more than one *pro tem* immediate scientific supervisor. A Scientist can be the Principal Investigator and line manager for one project and can be a participant on another project. Each employee has but one overall permanent supervisor.

A current ESD Organization Chart is included in Appendix 1.

ESD is committed to performing work safely and in a manner that ensures protection of employees, the public, Laboratory assets and the environment. ESD's Program line management, its staff, contractors, students and guests are responsible and accountable for the safe performance of work, and will exert sufficient care, and provide resources toward the safe conduct of its operations. ESD will demonstrate by means of its internal Environmental Health and Safety (EH&S) systems that it is performing the five EH&S core functions and achieving the seven Guiding Principles described in the Laboratory's Integrated Safety Management System (ISMS).

ISMS IMPLEMENTATION WITHIN ESD

The Berkeley Laboratory's EH&S policies and requirements are contained in the Regulations & Procedures Manual (RPM) http://www.lbl.gov/Workplace/RPM/, the Health & Safety Manual (PUB-3000) http://www.lbl.gov/ehs/pub3000/, the Integrated Environment, Health & Safety Management Plan (PUB 3140) http://www.lbl.gov/ehs/ism/Title.html and the Self-Assessment Program Implementation Plan (PUB-5344) http://www.lbl.gov/ehs/oaa/02prog_docs/pub_53440201.pdf. These policies and procedures implement the contractual requirements between the Department of Energy and UC Berkeley contained in Contract 98 http://labs.ucop.edu/internet/comix/, Appendices F (Performance Measures) and G (Directives). This Integrated Safety Management Plan (referred to as the Plan) explains how these policies and procedures will be implemented in ESD and defines the roles and responsibilities for ESD employees, students, visitors, participating guests and contractors. The Plan will be reviewed, and modified if necessary, as part of the Division's Annual Self-Assessment to assure continuous improvement.

Through the self-assessment process, ESD has identified three opportunities for improvement that should be addressed in the coming year. These are as follows**:**

1. **Off-site work reviews and authorizations-** ESD currently has numerous off-site projects. Each project has an Off-Site Safety and Environmental Protection Plan (OSSEPP) on file. However, ESD does not have a mature process for tracking changes and closure to these Plans. Action to Rectify: We will examine new processes for ensuring that off-site work is managed effectively and that all hazards are identified and minimized to the extent possible.
2. **ESD use of LCATS Database**- In the fall of 2001, a new web-based Laboratory Corrective Action Tracking System (LCATS) was initiated. ESD does not currently track all safety deficiencies using LCATS, but instead uses other tracking systems (spreadsheets, notebooks, etc). Walkthroughs of ESD space are continuing and all deficiencies are corrected in a timely manner. Nevertheless, use of the LCATS system will ensure proper tracking, reporting and trending of safety issues. Actions to Rectify: Division Coordinator will complete input of deficiencies in a timely manner. On a quarterly basis, we will send current deficiency lists to each Dept. Head, PI, and other staff who have deficiencies. In addition, verification visits by the Division Safety Coordinator will be undertaken and staff will be promptly notified following inspections.
3. **Line Management participation in EH&S**- Substantial improvements have been made in this area. We continue to have all work spaces examined routinely by line management and we involve senior Division management in walkthroughs. However, ESD needs to continue efforts to gain line management and Division staff participation. In certain areas, safety is still not an inherent part of the research planning and activities. Actions to Rectify: 1) Department Heads will encourage PI's to regularly participate in safety related activities such as including safety as an agenda item in

group meetings, correcting deficiencies with LCAT items, monitoring SAA inspections and regularly reviewing JHQ training. 2) Supervisors will emphasize safety and assess employee's performance in this area during the employee's annual review. As required in the new PRD process, supervisors will also examine training deficiencies. 3) PI's/Supervisors will be tasked to critically evaluate their areas for serious safety issues. The ESD Safety Committee and Division Safety Coordinator will then assist the projects in addressing the problem areas. This process will make the search for the "critical issues" one of the primary focus points of the supervisor's safety walk through.

The contract between DOE and the University of California for operation of LBNL directs LBNL to assure safety in its operations "… regardless of the performer of the work". Accordingly, all ESD, regardless of their job classification or work location, are included in this Plan. This Plan has been reviewed and when necessary updated to address these issues and includes clear expectations for safety performance of all work conducted within ESD.

ESD employees, students, visitors, participating guests and contractors are expected to read, understand and follow the requirements of this Plan. Furthermore, each employee's safety performance will be measured against the provisions of this Plan during his/her annual Performance/Progress Review (P2R or PRD). It should be noted that an employee can not attain an overall rating of "E/VG" (exceeds expectations) if any one expectation, including safety, is rated at or below an "I" (improvement needed).

Responsibility and Accountability

All employees in ESD, regardless of job classification, work location, seniority, or supervisory responsibilities, are included in this ISM Plan and are responsible for working safely. Furthermore, Department and Program Heads, Principal Investigators, Group Leaders, supervisors and those serving in management roles or having management titles, have a special and unique responsibility for this by providing safety leadership. This section discusses the safety responsibilities of all ESD personnel, students, visitors and participating guests.

The **Division Director** is responsible and accountable to the Laboratory Director for assuring that demonstrable policies and programs are established and implemented to support and comply with the Laboratory's EH&S policies and requirements. The Division Director shall lead discussions on relevant safety issues at Division Council meetings and Division wide town hall meetings. Safety shall be an agenda item at these meetings. He shall also maintain his visibility and demonstrate line management commitment to EH&S by periodically walking through Division space. The Division Director shall review and approve this Plan on an annual basis. Furthermore, he shall hold all ESD staff accountable for understanding and complying with its provisions.

Lastly, the ESD Division Director has implemented a policy for employees who are injured on the job. This policy is intended to improve communications. Effective immediately, any injured person and their supervisor shall meet with the Division Director to discuss the details and cause of the injury. In addition, the injured person shall write a lessons learned report.

The **Division Safety Coordinator** (DSC), appointed by the Division Director, is responsible and accountable to the Division Director for establishing, documenting, disseminating, and tracking Division EH&S policies. In addition, he shall provide quarterly Division EH&S Program Status Reports to the Division Director and provide additional reports to persons and offices of outside organizations with and for whom ESD conducts research. He shall also conduct additional safety surveillances at the request of the ESD Director. The DSC shall provide an annual Self-Assessment Report to the EH&S Division Office of Assessment and Assurance, through the ESD Director. The DSC shall review and revise this Plan annually.

The Division will maintain a **Division Safety Committee**, consisting of the DSC, one representative from each Department, and the EH&S Division Liaison to the Earth Sciences Division. The Division Director will participate on an *ex officio* basis. The Safety Committee will monitor the implementation of the Division's EH&S program, identify opportunities for improvement and advise the Division Director on EH&S issues.

The Committee will be chaired by an ESD staff member, appointed by the Division director, and will organize quarterly meetings, set agendas and will record and publish meeting minutes which will be distributed as appropriate. Each meeting will be initiated with a resolution-oriented discussion of the most critical current divisional safety issues.

Department Heads and Program Heads are responsible and accountable to the Division Director for understanding Berkeley Laboratory's EH&S policies. They are further responsible for understanding and complying with the provisions of this Plan and for assuring that it is understood and is being implemented by their line managers (Group Leaders, Principal Investigators and other supervisors). Department and Program Heads shall lead discussions on relevant safety issues at their respective meetings. Safety shall be an agenda item at these meetings.

Department Heads will lead at least two inspections per year of ESD on-site spaces where people in their Department work. These shall be documented on the Earth Sciences Division Safety Checklist (Appendix 2). Corrective actions for noted deficiencies will be assigned to the Principal Investigator responsible for the area. Follow up inspections will be conducted by the cognizant Department Head within 60 days in those areas where deficiencies or corrective actions were identified. This is to ensure that corrective actions have been implemented. In addition to the semiannual inspections, any safety deficiencies noted at any time by the Department or Program Heads shall also be corrected within 60 days.

Safety responsibilities for Department Heads and Program Heads are further explained in the section entitled, "EH&S Roles Responsibilities within ESD" (below).

Principal Investigators, Group Leaders and other supervisors are accountable to their Department Head and Program Heads for understanding and complying with the provisions of this Plan and for assuring that on-site and off-site research activities receive a Safety Analysis Review, that work hazards are identified and controlled, that appropriate safety documents are prepared and/or reviewed, that all work is carried out in a safe manner and in accordance with all Laboratory and Divisional EH&S requirements as set forth in this Plan. Furthermore, they shall ensure that those working for them (including students and matrixed employees) have completed the Laboratory's Job Hazards Questionnaire (JHQ), have taken all required EH&S training courses, are properly trained, and that their training statuses are reviewed as part of their annual P2R. Principal Investigators and other supervisors shall also lead discussions on relevant safety issues at their respective meetings. Safety shall be an agenda item at these meetings.

Safety responsibilities for Principal Investigators, Group Leaders and other supervisors are further explained in the section entitled, "EH&S Roles Responsibilities within ESD" (below).

Employees, students, participating guests, and contractors are responsible for understanding and complying with the provisions of this Plan and for knowing and following the EH&S requirements that apply to their work. They are expected to understand, and be trained to deal with the hazards associated with their work, to work safely, to report all unsafe conditions and accidents to their supervisors and to comply with the Division's EH&S requirements. ESD employees, students, participating guests, and contractors as well as those matrixed to ESD from other Divisions, are expected to review their JHQ annually, to update it and to complete required training whenever there is a change in job duties. This includes assignments to other ESD Programs.

All Berkeley Lab employees, contractors, and participating guests are responsible for stopping work activities considered to be an imminent danger. If there are concerns about the safety, health effects, and/or environmental impact of an activity, persons performing the work may stop the work and ask their supervisor, the Division Safety Coordinator or a member of the EH&S Division staff for assistance to resolve the issue before proceeding. It is important to emphasize that the employee's supervisor should be regarded as the *primary* point of contact for all safety concerns. The safety reporting structure is further defined in the following section entitled, "EH&S Roles and Responsibilities within ESD" (below).

<u>EH&S Roles and Responsibilities within ESD</u>

Each employee has one department supervisor who looks after the employee's professional development, training, and mentoring. Except as noted below, the department supervisor is also the employee's EH&S supervisor. In this capacity, the department supervisor is responsible for addressing day-to-day safety issues, such as informing the employee of works hazards

and controls, making sure the employee works safely and within controls, answering EH&S questions and investigating accidents.

Exceptions to this may occur when an employee conducts part of his/her work away from his/her normal work environment, such as when working at one of the following sites: (1) an off-site field location, (2) one of the ESD Centers or Labs listed in the following section, or (3) an on-site facility belonging to another Division. In these cases, the employee's *immediate* safety supervisor is the appropriate on-site lab/facility manager, Principal Investigator or the off-site safety manager designated in the particular ESD Off-Site Safety and Environmental Protection Plan.

Scope of Work Authorized

a. General

ESD employees develop tools and knowledge that enhance our understanding of the Earth. They perform three types of research work: (1) theoretical and computational studies in offices, (2) analytical measurements, instrument development, and bench-top physical modeling in wet labs and instrument shops, and (3) geoscience data acquisition at various off-site (also called *field*) locations.

Laboratory measurements and bench-top experiments are conducted in several on-site facilities:

The Center for Isotope Geochemistry (70A)
The Center for Environmental Biotechnology (70 and 70A)
The Rock and Soils Laboratories (51-007 and 51F),
The Environmental Measurements Laboratories (70), and
Geoscience Measurements Facility (64 and 51-008).

Off-site work, comprising approximately 2.5 to 5 percent of the total annual ESD labor effort, is conducted at various sites owned and managed by federal, state, and private organizations.

b. Work Requiring Safety Review and Approval

Line managers will ensure that all work is conducted within authorizations and that the authorization documentation is reviewed at least annually and updated as personnel assignments and experimental procedures change. To determine the level of safety documentation, worker training, hazards and hazards control for each project, Principal Investigators will review LBNL Pub 3000 Chapter 6, Safe Work Authorizations and complete a Safety Analysis Review (SAR) (Appendix 3a) at the time of Field Work Proposal (FWP) or proposal submission or renewal. Each SAR is reviewed by the DSC, who may consult with EH&S Division professionals for ad-

vice on whether the project requires additional safety documentation and EH&S approval such as a: Radioactive Work Authorization (RWA), Sealed Source Authorization (SSA), Activity Hazards Document (AHD) or an Off-Site Safety and Environmental Protection Plan (OSSEPP) (Appendix 3b). An OSSEPP is required for all off-site research activities. An approved OSSEPP, read and signed by each worker, is required before travel will be authorized for off-site work other than an observer's visit. The OSSEPP is intended to document site-specific and work-specific hazards, to inform workers of the hazards present, to identify the training and protective measures needed to perform work safely, to provide emergency information and to serve as a safety training document. The Principal Investigator of each off-site project is responsible for preparing an OSSEPP in accordance with ESD procedures and the health and safety rules, procedures, training requirements and other guidelines established at each off-site facility. Travel authorization for persons assigned to an off-site research project will be contingent on their names and signatures on an approved OSSEPP. These are to be kept on file in the ESD Division Office and will also be posted or readily available at the work site.

The work presently being carried out in ESD that requires additional EH&S documentation and approvals is listed in Appendix 4.

c. Work on the UC Berkeley Campus

Work carried out on the UC Berkeley Campus in spaces under the control of UC Berkeley will be carried out in accordance with the "MEMORANDUM OF UNDERSTANDING BETWEEN UCB AND LBL CONCERNING ENVIRONMENT, HEALTH AND SAFETY POLICY AND PROCEDURES", dated June 20, 1993.

Qualifications and Training

All ESD employees, students, contractors, and guests shall have the necessary technical skills, knowledge, training, personal protection equipment, and certifications required by law and by Laboratory policy to perform their duties safely and in a manner protective of the Laboratory's assets and the environment.

Everyone working for more than 30 days in a calendar year at the Berkeley Laboratory will complete a Job Hazards Questionnaire (JHQ). The recommended approach is for the supervisor and employee to complete the JHQ (on-line) http://www-ehs.lbl.gov/. The employee's supervisor is responsible for ensuring this is done.

The output of the JHQ process is a list of required and recommended safety training. Each employee's supervisor will ensure the required LBNL training courses are taken within a 90-day period. Depending on the job requirements, the supervisor may specify additional training, such as off-site courses and on-the-job training. Supervisors are responsible for reviewing the training status of their staff each year as part of the PRD/P2R annual review process. Em-

ployees are responsible for attending required training and for updating the JHQ annually or whenever a change in job duties occurs. This includes temporary assignments to other ESD Programs outside of their home Departments and Programs. (See the section entitled, "EH&S Roles and Responsibilities within ESD). Employees who are assigned to off-site project work may be subject to additional site-specific, natural and man-made hazards. The project Principal Investigator shall ensure that these employees are informed of any new hazards as well as any additional controls required for protection. This shall be communicated by the OSSEPP developed for that project. The project Principal Investigator shall also ensure employees take additional training required by the host site.

For persons working at the Berkeley Laboratory for 30 days or less and engaged in field or laboratory research, the type of safety training will be determined by the applicable supervisor. Until they have received proper training, they must work under the direct supervision of their supervisor.

Worker Safety

Supervisors will provide employees with a safe workplace and will ensure that work is performed within the authorized controls.

Line managers (i.e., Principal Investigators, supervisors or other individuals having cognizance over a work area) shall ensure that workplace hazards are identified, evaluated and controlled and that employees are provided with and use the appropriate safety controls including personnel protective equipment and proper ergonomic furnishings. Line managers shall also hold each employee accountable for safety as well as recognize EH&S contributions via the PRD/P2R process.

Department Heads shall conduct safety walk-throughs of laboratory and office areas under their jurisdiction to identify and correct EH&S deficiencies. The purpose of these walkthroughs is to prevent accidents by identifying and correcting EH&S deficiencies. They also serve to heighten EH&S awareness among staff members and demonstrate the importance that line management attaches to safety. Walkthroughs will be conducted at least twice a year. Principal Investigators will participate in safety walk throughs and shall be held accountable for correcting all identified EH&S deficiencies. Follow up inspections will be conducted by the cognizant Department Head within 60 days in those areas where deficiencies or corrective actions were identified. This is to ensure that corrective actions have been implemented.

Walk throughs will be documented on the enclosed ESD Safety Checklist (Appendix 2).

Accidents that occur within the Division shall be thoroughly investigated to identify root cause and prevent recurrence. The immediate supervisor, injured employee, ESD Safety Coordinator and the EH&S Division Liaison will meet together and investigate each injury/illness at the site of its occurrence. Furthermore, supervisors are required to discuss accident investigation

findings and corrective actions for all DOE Recordable Accidents at the Division Safety Committee. In addition, the Division Director will meet with all injured employees as discussed above. This will ensure that ESD management actively participates in investigating accidents and is held accountable for corrective actions to prevent recurrence.

Repetitive motion injuries account for a significant fraction of the injuries and illnesses in ESD. To address this, an ergonomics initiative has been developed. This is aimed at identifying, prioritizing and correcting deficient ergonomic conditions on a graded approach. (See Appendix 5 for details of the ESD Ergonomic Initiative status).

Environmental Protection and Waste Management

ESD will conduct activities in a manner that protects the environment while complying with applicable air quality, water quality, and hazardous waste requirements, including appropriate efforts to prevent pollution and to minimize wastes produced.

The assigned ESD Custodian (see Appendix 6) is responsible for ensuring that all hazardous, mixed, and radioactive waste added to a Satellite Accumulation Area (SAA), to a Mixed Waste Accumulation Area (MWAA), and/or to a Waste Accumulation Area (WAA), is accurately labeled, characterized and picked-up in a timely fashion. No ESD employee shall add wastes to an SAA, MWAA or WAA without having taken the appropriate LBNL/EHS training and without the knowledge and approval of the assigned custodian. All employees who generate waste shall separate waste streams to minimize the burden of waste disposal (for example, by keeping chlorinated and nonchlorinated solvents separate, and keeping radioactive and chemically-hazardous wastes separate).

Working with the DSC, the EH&S Division Waste Management Generator Assistant is responsible for scheduling, conducting, and documenting inspections of all SAAs and for helping ESD staff to improve waste management, to reduce amount of hazardous and mixed waste generated, and to seek on-site treatment strategies. SAA inspections will be conducted quarterly, and the results will be documented and distributed to the designated custodians, as well as the Division Director, Department Heads, and the Division Safety Committee members. WAA inspections will be conducted weekly by the EH&S Division Waste Management Generator Assistant.

Balanced Priorities

ESD management and ESD Principal Investigators will allocate an appropriate amount of resources to EH&S requirements.

Principal Investigators will factor into their budget plans the costs of safety equipment, employee training, permits, proper chemical storage and inventorying, waste disposal, pollution prevention, environmental protection, ergonomic furniture/accessories, and facility modifications, unless the latter are covered by institutional funding sources.

To facilitate implementation and execution of the ESD EH&S Program, the following Divisional resources are made available:

0.30 x FTE,	Division Safety Coordinator
0.10 x FTE,	Division Administrative Support.

In addition, EH&S Division will provide 0.7 x FTE on a matrix basis to assist the ESD Safety Coordinator and ESD staff. Resources to be committed are as follows:

0.15 x FTE,	Division Liaison
0.10 x FTE,	Industrial Hygiene and Health Services
0.04 x FTE,	Occupational Safety
0.08 x FTE,	Fire Protection
0.03 x FTE,	Emergency Preparedness
0.08 x FTE,	Radiation Protection
0.02 x FTE,	Environnemental Protection
0.10 x FTE,	Waste Management

ACCEPTANCES

Signatures

Submitted by: _____

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EH&S Resource Commitment: _____

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Accepted: _____

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